DRAFT

VEGETATION RESOURCES MANAGEMENT PLAN
DESERT STATELINE SOLAR FARM PROJECT
BLM CASE FILE NUMBER CACA-48669
SAN BERNARDINO COUNTY, CALIFORNIA

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August 29, 2012

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1.0 INTRODUCTION

1.1 Background

This section provides a brief description of the Stateline Solar Farm Project (Project; Case File #CACA-48669) proposed by Desert Stateline, LLC. (Stateline), who has requested a right-of-way grant from the U.S. Bureau of Land Management (BLM) to construct and operate a new solar photovoltaic energy generating facility, to be located in unincorporated San Bernardino County, California, near the interstate boundary of California and Nevada, southwest of Primm, Clark County, Nevada (Figure 1). The Project would include a 300-megawatt (MW) alternating current (AC) solar photovoltaic (PV) energy-generating Solar Farm and 220-kilovolt (kV) transmission line. The Solar Farm components would include PV arrays, transformers, an on-site electrical substation, a monitoring and maintenance facility, one or more meteorological stations, a security guard facility, site fencing, a 2.3-mile generation tie-line, and primary access road. A detailed description of the Project is included in the Plan of Development (First Solar, 2011). The Project site is located west of Interstate 15 and Ivanpah Dry Lake and can be found on the Ivanpah Lake 7.5-Minute U.S. Geological Survey topographic quadrangle (Figure 2). The site is located on BLM-administered lands outside the boundaries of an Area of Critical Concern (ACEC), Desert Wildlife Management Area (DWMA), BLM wilderness area, or U.S. Fish and Wildlife Service (USFWS) designated critical habitat unit (CHU).

Stateline has prepared this Vegetation Resources Management Plan in accordance with regulatory agency guidance and to provide details regarding the proposed salvage and transplantation of target species [eight special status plant species (listed by the California Native Plant Society) and ten additional species of succulents] that would potentially be affected by the Project. This plan includes the following:

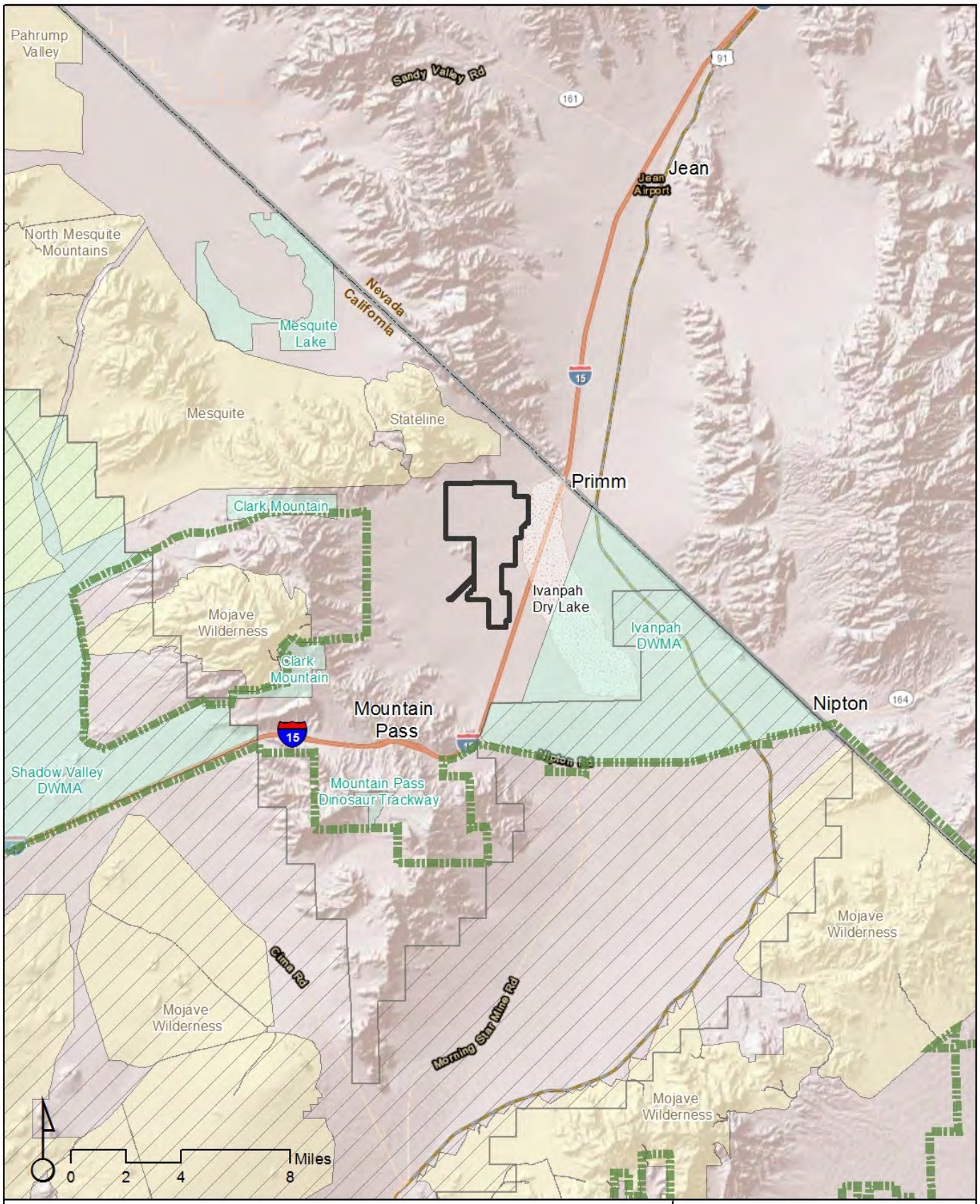
- Distribution of target plants within the Project site;
- Criteria for determining whether an individual plant is appropriate for salvage;
- Equipment and methods for salvage, propagation, transport, and planting;
- Procedures for marking and flagging target plants during preconstruction clearances surveys;
- Storage and/or pre-planting requirements;
- Proposed transplantation sites;
- A requirement for ten years of maintenance of the transplanted individuals, including removal of invasive species and irrigation (if necessary); and
- A requirement for ten years of monitoring to determine the percentage of surviving plants each year and to adjust maintenance activities using an adaptive management approach.

This plan is applicable to any alternative within the overall application area because the distinctions between possible alternatives would not be expected to affect the purpose, content, or implementation of the plan itself.

Stateline Solar Farm Project
Desert Stateline, LLC

Figure 1
Regional Setting

Ironwood Consulting, Inc. - June 27, 2011



Stateline Solar Farm Project
Desert Stateline, LLC

Figure 2
Project Location

Ironwood Consulting, Inc. - June 27, 2011

1.2 Regulatory Setting

The Native Plant Protection Act (NPPA) of the 1977 Fish and Game Code (Sections 1900 through 1913) directed the California Department of Fish and Game (CDFG) to carry out the Legislature's intent to "preserve, protect and enhance rare and endangered plants in this State." The NPPA gave the California Fish and Game Commission the power to designate native plants as "endangered" or "rare" and protect endangered and rare plants from take.

The California Desert Native Plants Act of 1983 (Division 23 [commencing with Section 80001]) of the Food and Agricultural Code is intended to protect California desert plants from unlawful harvesting on both public and privately held lands, and to provide information necessary to legally harvest native plants. This code allows removal of certain nonlisted desert plants under permits issued by the county agricultural commissioner or sheriff. The Act specifically defines plants that may have limited harvest with appropriate landowner approval and permitting. "Landowner" includes the public agency administering any public lands within the areas subject to this division. The county agricultural commissioner may establish specific cutting, harvesting, and plant care criteria that would include the most favorable and practical horticultural methods and seasons to ensure the survivability of the plants, as well as to ensure compliance with existing local, state, and federal regulations.

Title 8 of the San Bernardino County Development Code, Division 9, Plant Protection and Management, includes regulations on removing and salvaging desert plants. Chapter 4, Desert Native Plant Protection, prohibits removal of protected desert plants, except as approved by the State Department of Food and Agriculture, and as specified in the Desert Native Plant Act of 1983, as amended. The San Bernardino County Agricultural Commissioner will be responsible for issuing the appropriate tags, seals, and permits required by the state. However, this regulation generally applies only to private lands, or unincorporated county land, and does not apply to federal government lands.

The BLM does not allow the collection or the take of cacti and yucca on federally managed lands without a special use or other applicable permit. Although most cactus species are not on the BLM's Sensitive Plant List (2004), the BLM typically requires some level of salvage of succulent species in the Mojave Desert of California. These standards usually follow a hierarchy of perceived horticultural value, whereby those species most valued by landscapers and collectors (hence those most commonly lost as a result of poaching on federal lands) are most frequently identified for salvage.

2.0 EXISTING CONDITIONS

2.1 Methods

2.1.1 Special Status Plant Species

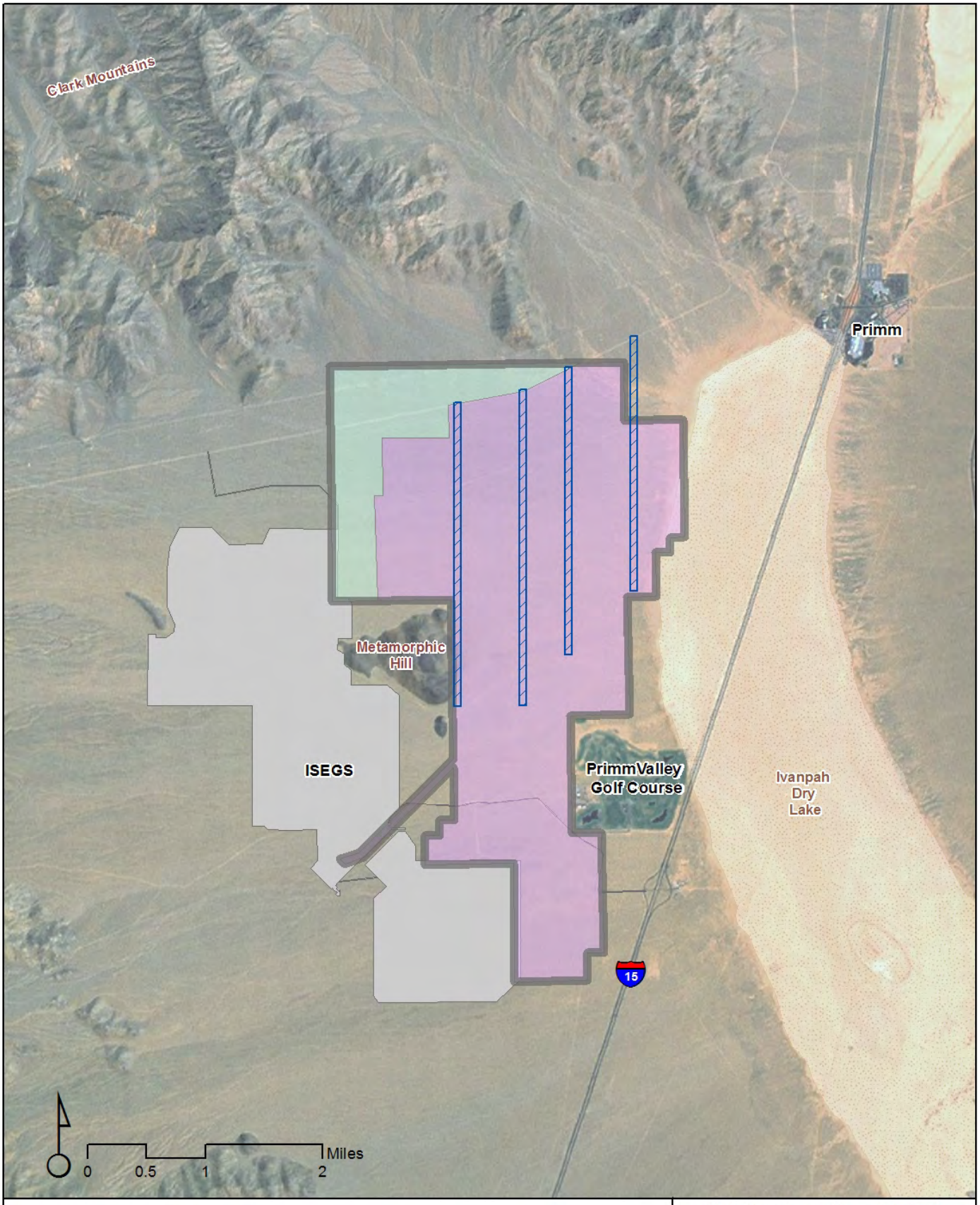
Surveys were performed to maximize the likelihood of locating special status plant species or special status natural communities within the study area. The primary objective was to identify all plant species within the study area to the taxonomic level (i.e., species, subspecies, or variety) necessary to determine rarity status. The botanical study followed the guidelines set forth by:

- Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFG 2009);
- Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species (BLM 2009); and
- Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants (USFWS 2000).

All survey periods were scheduled to coincide with the primary blooming period for targeted special status species. Four surveys efforts were performed separately in 2008, 2010, 2011 and 2012 with the majority of the Study Area surveyed in 2010.

The initial surveys in spring (March 23; April 3, 4, 10, and 17; May 1 and 9) and fall (September 23; October 1 and 9) of 2008 were conducted following the intuitive controlled survey method, which is suitable for large areas and highly skilled investigators (BLM 2009). A team of experienced botanists led by Kent Hughes and Jim Andre performed multiple field visits when target species were most identifiable. The field botanists conducted meandering pedestrian transects throughout the entire project site. A complete survey was conducted in habitats with the highest potential for supporting the target species. Subsequently, surveys were focused in Sections 12, 14, and 15 within the upper alluvial fan, which contained stabilized rocky soils and higher plant diversity than lower regions of the alluvial fan where diversity was substantially lower. All plant species observed during the surveys were identified and recorded. The location of each special status plant species was recorded on a Garmin 60CSx GPS unit. For some species (e.g., *Coryphantha chlorantha*) that occurred in small groups, one GPS record was created and the numbers of individual plants were recorded in the botanist's notes. All recorded data were incorporated into GIS and Minimum Convex Polygons (MCPs) areas were calculated using XTools Pro 7.0 to estimate area of occupied habitat.

The subsequent full-coverage survey efforts were performed from April 14 to May 9, 2010 (approximately 3,800 acres), April 10 to 18 and May 27 to 28, 2011 (approximately 1,120 acres), and May 11 to 12, 2012 (approximately 260 acres).



Primary Study Area

Full-Coverage Surveys

Intuitive Controlled Surveys

Cactus and Yucca Sampling Area (80m wide)

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Figure 3
Botanical Study Area

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The survey team included personnel familiar with the identification of flora in the Mojave Desert of California. Assistants were trained in species identification during the early phase of the study. Information on potential special status species was reviewed by the survey team to obtain an effective search image. Records of all plants species observed were maintained daily. A checklist was developed based on previous surveys and reviewed during each subsequent day of survey. On average, linear pedestrian transects were walked at 15-meter spacing. In areas of lower cover and diversity (e.g., desert pavement), transects were spaced further apart. In areas of greater cover and diversity, transects were spaced closer to one another. This allowed for a comprehensive survey of the study area. Surveyors walked at a rate of approximately 1 mile per hour. At this rate, the resulting level of effort averaged 1 person-hour per 6 acres survey area. Additional time was spent in the field and after the day survey keying plant taxonomy. If a plant of unknown identification was found, a GPS record was taken and a unique identification number was assigned so that if after proper identification, it was determined to be a special status species, the population could be revisited to collect additional data.

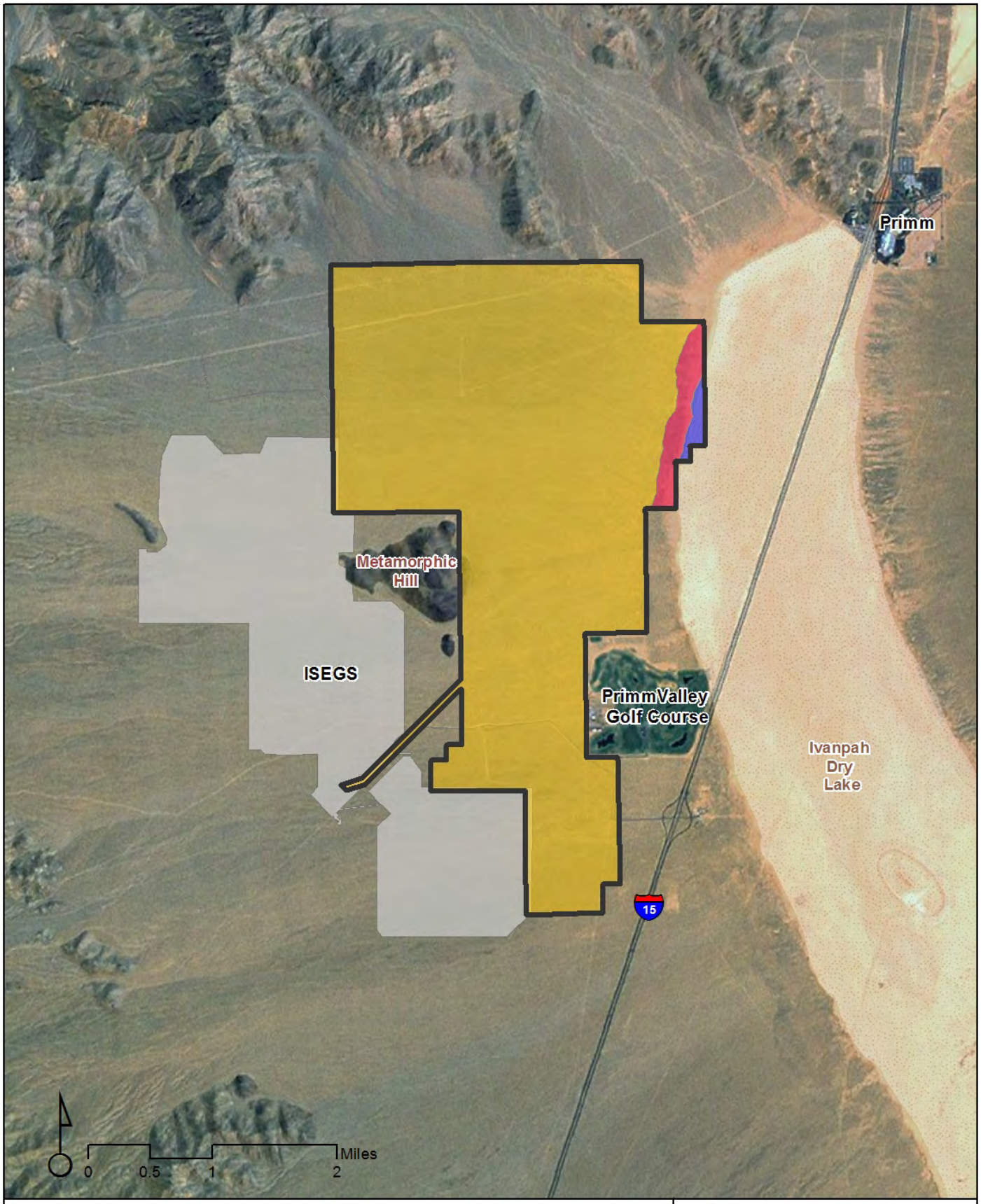
2.1.2 Succulents

Systematic sampling was conducted in spring of 2012 by botanists experienced with Mojave Desert flora. The purpose of this sampling effort was to estimate the number of individual cacti and yucca present. The survey crew walked over 125 kilometers of transects (equal to over 300 acres of coverage) in the north-south direction across four elevation cross sections (Figure 3). All species of cactus were documented and cumulative counts of the number of individual cacti were recorded. The resulting density of cacti within the sampling area was used to extrapolate estimates for the larger Project site.

2.2 Results

2.2.1 Vegetation Communities

The study area supports two macro vegetation communities: Creosote Bush-White Bursage Series (Sawyer and Keeler-Wolf 1995; analogous to Holland's Mojavean Creosote Bush Scrub, 1986) and Mixed Saltbush Series (Sawyer and Keeler-Wolf 1995; analogous to Holland's Alkali Desert Scrub, 1986) (Figure 4). Plant species typical of Creosote Bush-White Bursage Series found in the study area include creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), wirelettuce (*Stephanomeria pauciflora*), cheesebush (*Ambrosia salsola*), beavertail cactus (*Opuntia basilaris*), barrel cactus (*Ferocactus cylindraceous*), Mojave yucca (*Yucca schidigera*), and Nevada ephedra (*Ephedra nevadensis*). Within this community, plant diversity was observed to be higher within the rocky terrain of the stabilized alluvial fan, which occurred in the higher elevations (generally above 2,500 feet) within the northern- and southern-most extents of the study area. The eastern extent of the study area borders Ivanpah Dry Lake and supports Mixed Saltbush Series. This community is situated within a relatively narrow band that begins at the edge of the non-vegetated dry lake and extends to the west approximately 800 feet. The dominant plant species occurring in this community include cattlespinach (*Atriplex polycarpa*), four-wing saltbush (*Atriplex canescens* ssp*. canescens*), and wheelscale (*Atriplex elegans*). More than 190 species of plants were identified within study area during the surveys.



Primary Study Area

Creosote Bush-White Bursage Series

Mixed Saltbush Series

Unvegetated Dry Lakebed

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Figure 4
Vegetation Communities

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2.2.2 Special Status Plant Species

The focused botanical surveys completed from 2008 to 2012 documented eight special status plant species with the potential to occur on the Project site (Table 1 and Figure 5). All special status plant species, with the exception of small-flowered androstephium (*Androstephium breviflorum*), were associated the gravelly, rocky terrain of the stabilized alluvial fan, which occurred in the higher elevations (generally above 2,500 feet) where plant diversity was found to be relatively higher compared to lower elevations of the alluvial fan near the dry lakebed. Small-flowered androstephium had an inverse distribution to the other plant species in that this species was found within the finer soil conditions lower in the alluvial fan.

Table 1 - Special Status Plant Species Occurring within Study Area

Scientific Name	Common Name	Status	Blooming Period	Life Form	Occurrence within Study Area
Special Status Species					
Androstephium breviflorum	Small flowered androstephium	CNPS 2.2	Mar-Apr	Annual bulbiferous herb	Lower-elevation active alluvial fan (140+ individuals at 91 locations)
Asclepias nyctaginifolia	Mojave milkweed	CNPS 2.1	May-Jun	Perennial herb	Upper-elevation stabilized alluvial fan (100+ individuals at 15 locations)
Coryphantha chlorantha	Desert pincushion	CNPS 2.1	Apr-Sept	Succulent	Upper-elevation stabilized alluvial fan (~20 individuals at 17 locations)
Coryphantha vivipara var. rosea	Viviparous foxtail cactus	CNPS 2.2	May-Jun	Succulent	Upper-elevation stabilized alluvial fan (Sections 13, 14 and 15 only)
Cynanchum utahensis	Utah vine milkweed	CNPS 4.2/NEMO	Apr-Jun	Perennial herb	Upper-elevation stabilized alluvial fan (30+ individuals at 12 locations)
Enneapogon desvauxii	Nine-awned pappusgrass	CNPS 2.2	Aug-Sept	Perennial herb	Upper-elevation stabilized alluvial fan (Sections 13, 14 and 15)
Grusonia parishii	Parish club cholla	CNPS 2.2/NEMO	May-July	Succulent	Upper-elevation stabilized alluvial fan (50+ individuals at 27 locations)
Sphaeralcea rusbyi var. *eremicola*	Rusby's desert mallow	CNPS 1B.2/NEMO	Mar-Jun	Perennial herb	Upper-elevation stabilized alluvial fan (12 individuals at 5 locations)

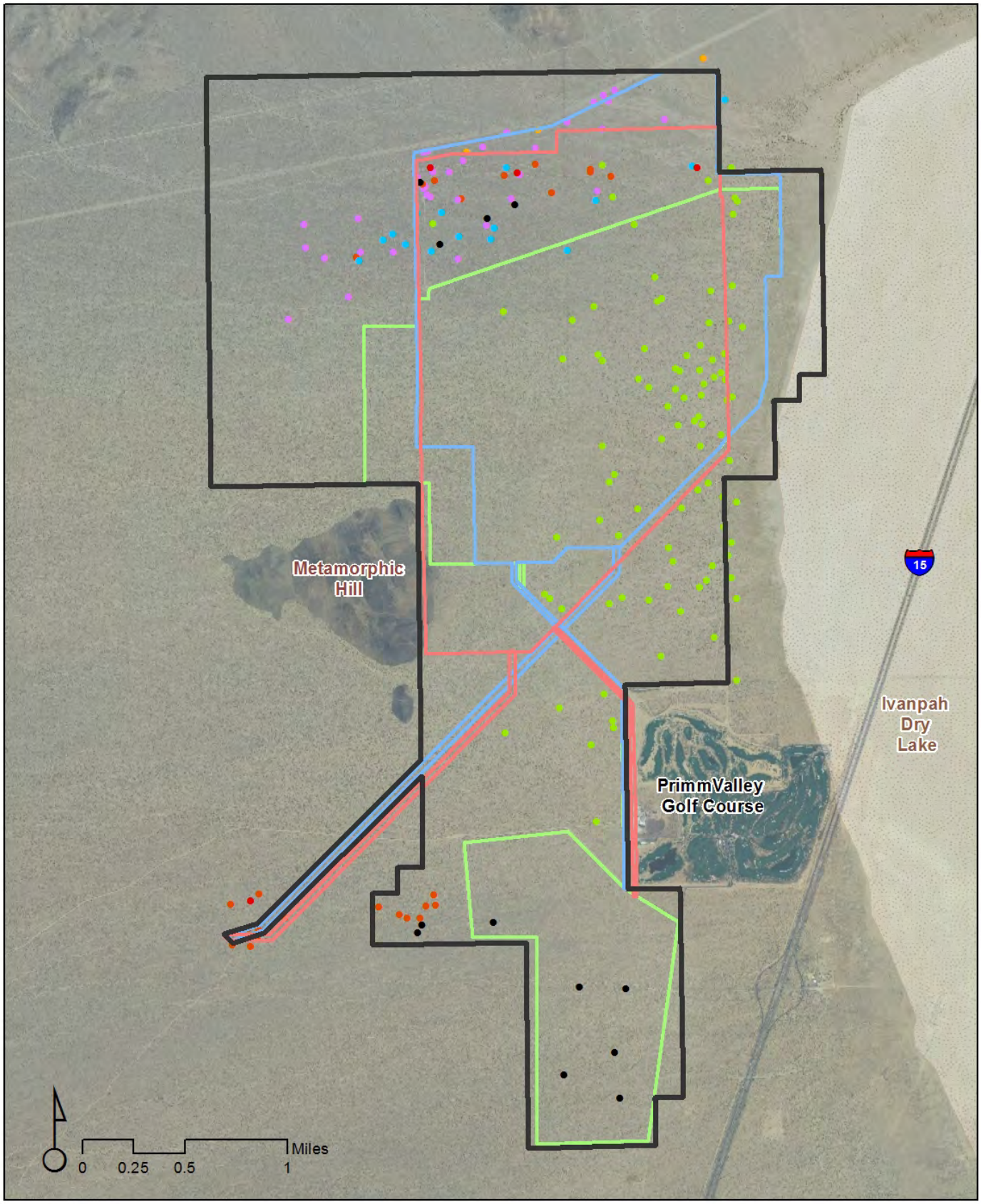

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Figure 5
Special Status Plant Species

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2.2.3 Succulents

Succulents include all species of native cacti and yucca. Cacti are generally characterized by fleshy, high-moisture tissues that occur above ground. Many species of cacti have relatively large rigid spines and small spines called glochids, which makes handling and difficult and potentially dangerous process. Species of cacti can be sorted into two fundamental groups based on the number of stems: single-stemmed and segmented.

Single-stemmed cacti include California barrel cactus (*Ferocactus lecontii* var. *cylindraceous*), cotton-top (*Echinocactus polycephalus*), fish-hook cactus (*Mammilaria tetrancistra*). Some life forms of single-stemmed cacti may in fact support several stems per individual that arise from the base of the cacti. These stems are neither branched nor segmented. Segmented cacti include prickly-pear (*Opuntia* spp.), cholla (*Cylindropuntia* spp.), and club cholla (*Grusonia* spp.). Prickly-pear cacti are generally characterized by upright, flat, jointed pads armed with spines. They can range from less than one foot to over four feet high. Cholla consists of branching, cylindrical stems that are often armed with dense spines and can easily become detached with the slightest pressure. Under natural conditions, detached stems are able to regenerate into new individual cacti. This feature allows for distinct salvaging techniques to be employed that do not require complete translocation of individual cacti (discussed further in Section 3.4.2). Cacti typically support root systems that respond quickly to changes in soil moisture. These attributes lend to higher success in transplantation efforts compared to other plant species.

Yucca species are not closely related to cacti but are included as a succulent. Yucca species are perennial monocots belonging to the Liliaceae (Lily) family. Only one species of yucca is present within the Project site: Mojave yucca (*Yucca schidigera*). Young Mojave yuccas appear as a basal rosette of stiff leaves up to two feet long that are armed with sharp tips. Mature Mojave yuccas support one to several trunks covered within dead leaves and a rosette of live leaves at the apex of the trunk. Yuccas do not possess the same physiological attributes of cacti and thus do not respond as well to transplantation.

The total number of succulents observed during focused sampling surveys was multiplied by a factor (project site area/survey coverage area) to provide an estimate of the number of cactus by species (Table 2). Succulents were generally found within the rocky terrain of the stabilized alluvial fan, which occurred in the higher elevations (generally above 2,500 feet) of the alluvial fan where plant diversity was found to be generally higher. Most succulents were rare or absent within lower elevations of the alluvial fan near the dry lakebed where soils are composed of finer material and lacking gravel, rocky substrates.

Table 2 - Succulents Occurring within Project Site

Scientific Name	Common Name	Growth Form	Estimated Quantity
Common Cacti			
Coryphantha chlorantha[1]	Desert pincushion	S	20
Coryphantha vivipara var. rosea[1]	Viviparous foxtail cactus	S	Less than 10
Cylindropuntia acanthocarpa	Buckhorn cholla	J	Less than 10
Cylindropuntia echinocarpa	Silver cholla	J	9,900
Cylindropuntia ramosissima	Pencil cholla	J	31,500
Echinocactus polycephalus	Cottontop	S	650
Echinocereus engelmanii	Calico cactus	S	60
Ferocactus cylindraceus	Barrel cactus	S	30
Grusonia parishii	Parish club cholla	J	50
Mammillaria tetrancistra	Fish-hook cactus	S	30
Opuntia basilaris	Beavertail prickly-pear	J	2,000
Opuntia erinacea	Mojave prickly-pear	J	50
Yucca schidigera	Mojave yucca	Y	3,000

[1] Special Status Plant Species; also listed in Table 1.

S = single-stemmed cacti
J = jointed (segmented) cacti
Y = yucca

3.0 CONSERVATION MEASURES

3.1 Roles and Responsibilities

The Applicant and BLM will appoint an Environmental Compliance Manager, Designated Biologist and Lead Botanist who will be responsible for the implementation of all aspects of the Vegetation Management Plan, including monitoring and reporting.

3.2 Voucher Specimens

Standard herbarium voucher specimens (with duplicates) will be prepared for all target species to provide a permanent archived record for future reference. The Lead Botanist will prepare a minimum of two sheets per taxon with associated phenotype, ecological, and coordinate data. After processing, all vouchers will be deposited into the Rancho Santa Ana Botanic Garden Herbarium (RSA) and the University of California Berkeley and Jepson Herbaria (UC/JEPS).

3.3 Clearance Surveys and Flagging

Pre-construction clearance surveys would be conducted for all *target species*: special status plant species and succulents. Surveys would be conducted in concert with desert tortoise clearance surveys. Locations of target species previously recorded during botanical surveys would be revisited to determine the current distribution of each species. The current locations of target species would be flagged for salvage/seed collection. Flagging would be of specific colors and/or patterns specific for target species salvaging. Flagging would generally be tied to target plants large enough to support proper placement. Smaller target plants would be marked using pin flags or lath stake with identifying colors and/or patterns specific for target species salvaging. Each target plant would be recorded on Global Positioning Unit as well as paper back-up forms and assigned a unique identification number. The Lead Botanist and crew would compile and map all the target species locations in Geographical Information Systems. For all single-stemmed cacti and yucca undergoing whole plant transplant, all individuals would be flagged on the north side to facilitate correct orientation during transplantation. All cacti not meeting criteria for salvage (Section 3.4.1) will remain unmarked and would not be salvaged.

3.4 Salvage

3.4.1 Special Status Plant Species

The assessment of appropriate salvaging techniques for special status plant species is centered on the likelihood for success. There is minimal information available about practical techniques for salvaging the special status plant species found within the Project site. Propagation from collected seed and/or vegetative cuttings is typically considered the best strategy for preserving and perpetuating these plants' genetic material. In some cases, whole individual transplantation may be determined appropriate. Potential uses for salvaged target plants would include seed production, propagation, transplantation to adjacent management sites, restoration of temporarily disturbed sites within BLM

management areas, rehabilitation during decommissioning, and donation to reputable nurseries for use in future restoration efforts.

Collection and Propagation

Initial efforts would emphasize seed collection of all target species following sufficient periods of rainfall. Collection will be prioritized for as long as possible until the end of the pre-construction phase when an attempt will be made to transplant these species. Careful seed collection, processing, and germination tests for viability will be undertaken by experienced contractors and/or institutions that specialize in botanical research [i.e., Rancho Santa Ana Botanic Garden (RSABG), Theodore Payne Foundation, and California State Polytechnic University, Pomona]. These specialized tasks require experienced biologists and horticulturists working in controlled conditions to ensure the highest chances of success. If a batch of viable germplasm becomes established and archived, seedlings will be germinated and propagated ex-situ. These seedlings will be allowed to mature in a controlled environment to the point that they are sufficiently stable and robust for transportation and out-planting within the appropriate transplant area. An adaptive out-planting protocol, including maintenance and monitoring, would be managed by an experienced horticulturist and implemented on-site by qualified staff. Seed not used for initial propagation efforts would be stored for future use. Coordination with botanical experts is underway to determine the most appropriate approaches for each target species.

Seed collection is likely appropriate for the majority of special status plant species; however, this technique may not be sufficient for small-flowered androstephium, which is an annual bulbiferous herb. This species is undetectable throughout most of the year except in the spring following sufficient winter precipitation. Primary methods to salvage this species would include excavating bulbs at locations where this species is evident, which would require that scheduling of project permits/authorizations and winter precipitation levels both allow for such an opportunity. If these conditions do not manifest ideally to allow for identification of individual plants and bulb excavation, then an alternative approach would be required. Topsoil salvaging in areas where previous records have been identified may be a viable method. Coordination with botanical experts is underway to determine specific alternative approaches for this species.

Propagation from cuttings would be attempted from each target species as determined feasible by the Lead Botanist in coordination with expert opinion. Success rates for vegetative propagation these particular taxa remain unknown (Hannon, 2010). Experienced horticulturists will be retained to attempt propagation and cultivation. If propagated shoots survive and appear viable and robust, attempted out-planting to the transplantation sites would occur. An adaptive out-planting protocol, including maintenance and monitoring, will be designed by an experienced horticulturist and implemented on-site by qualified staff.

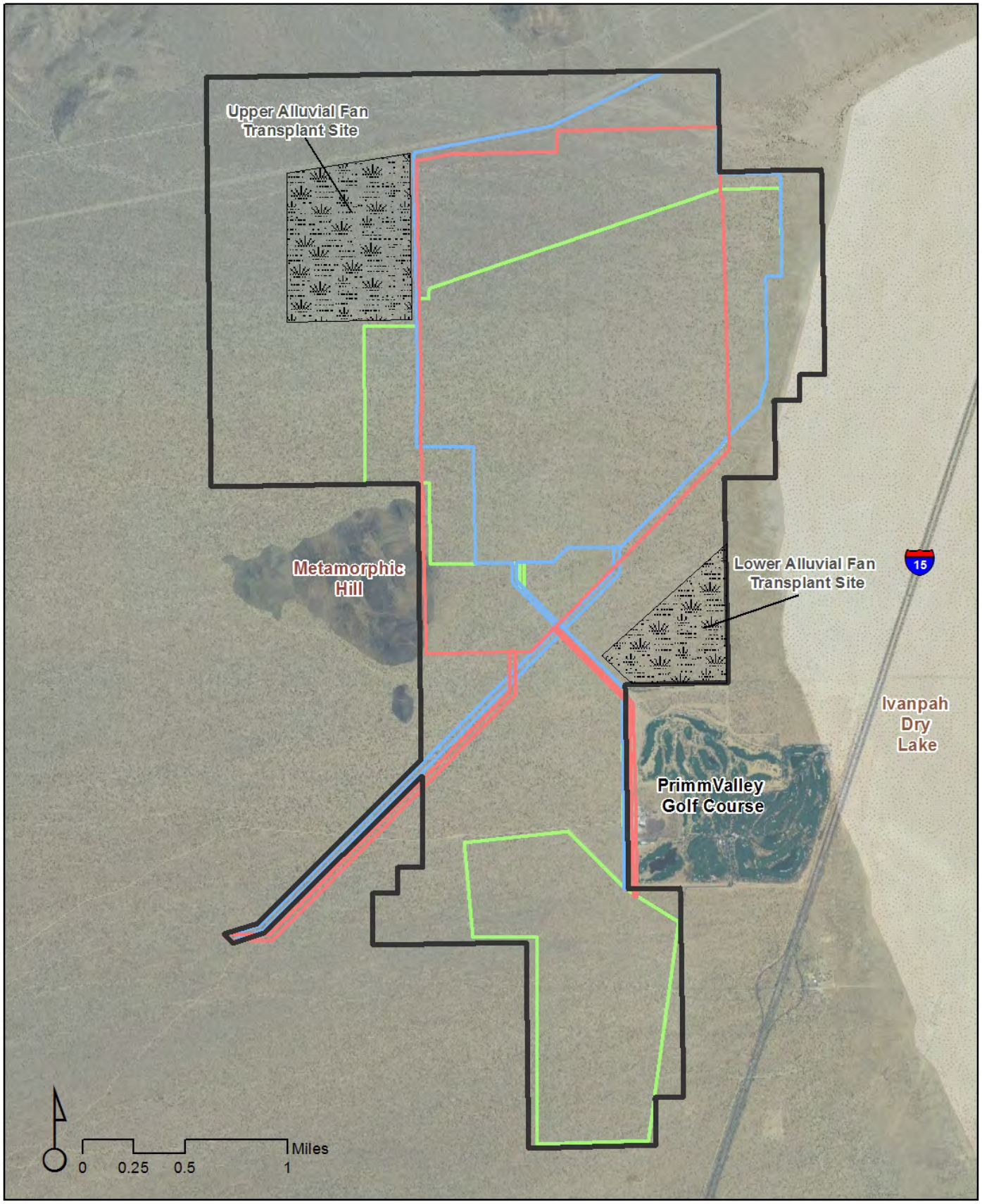
Transplanting

Propagation and transplanting of the target species would be attempted prior to construction of each project phase. Transplant holes will be initially prepared and several shovel-loads of surface soil from around the each target plant base will be carefully extracted and mixed-in to the planting hole to promote native mycorrhizal soil symbionts to be in close proximity to the root structure. Supplemental mycorrhizal inoculation may be implemented as necessary. These holes will then be filled with water and allowed to drain.

If whole plant transplantation is determined feasible for any of the target species, all target plants will be marked on the north side to aid in correct reorientation during transplanting. Successful extraction requires the safe removal of the aboveground plant with as-large-as-possible root ball incorporating intact soil. Specialized machinery (i.e., tree spade) may be required for this task. Transplanting of the extracted plants will take place immediately, into the freshly wetted receiving hole. North-facing original orientation will be reproduced. Soil surface will be lightly tamped down.

Transplant Sites

The majority of special status plant species identified within the Project site were associated the gravelly, rocky terrain of the stabilized alluvial fan, which occurred in the higher elevations (generally above 2,500 feet) where plant diversity was found to be relatively higher compared to lower elevations of the alluvial fan near the dry lakebed. For these species, a transplant site located northwest of the proposed solar farm would be established for transplantation efforts (Figure 6). Small-flowered androstephium had an inverse distribution to the other special status plant species. This species was primarily found within the finer soils located lower in the alluvial fan. A second transplant site located southwest of the proposed solar farm would be established for transplantation efforts of this species (Figure 6).



Primary Study Area

Proposed ROW - Alt 1

Proposed ROW - Alt 2

Proposed ROW - Alt 3

Transplant Site

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Figure 6
Transplant Sites

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3.4.2 Succulents

The following section outlines the salvage and transplantation methods for succulents based on their growth form. Cacti, although difficult to handle, generally transplant successfully (Bainbridge 2007; Abella and Newton 2009). Potential uses for salvaged succulents would include propagation, transplantation to adjacent management sites, restoration of temporarily disturbed sites within BLM management areas, rehabilitation during decommissioning, sale to the public, or donation reputable nurseries for use in future restoration efforts.

Condition Criteria

For each individual succulent species encountered, an assessment will be made of the likelihood that the salvage, propagation, and transplantation of that individual would be successful. Each succulent species determined to be in good or excellent condition will be salvaged. The general condition of each plant will be assessed and evaluated using the following assessment criteria:

- Excellent – over 80% live branches and stable root system
- Good – over 60% live branches and mostly stable root system
- Fair – less than 60% live branches and/or mostly stable root system
- Poor – Less than 40% live branches and unstable root system

Extraction

Extraction would occur between October and March to the greatest extent feasible. Equipment needed during extraction and transplantation may include shovels, mattock, bobcats or small excavators, buckets, rope/straps, pruning snips, wood pallets, pitch fork, standard 4x4 truck, brown paper bags. All marked cacti identified during clearance surveys will be relocated, dug-up, transported, and processed before outplanting on appropriate transplant site. All cacti will be handled by pitchforks, wraps or other sturdy handling devices. They will not be handled by their roots. Larger cacti may require guide ropes. The plants will then be placed on pallets in the nursery, covered with shade cloth to prevent sunburn, and stored for at least two weeks until roots have had time to callous to prevent fungal growth.

Temporary storage

All cacti will be brought to the transplant site and laid on wooden pallets. All roots will be inspected for damage, clipped cleanly to two to three inches from the plant base, and allowed to air dry for a period of one to three weeks to allow time for cut roots to dry-out and callous-over, thereby reducing the potential for pathogens and fungus during transplanting. All stored cactus during this period shall be covered with burlap or canvas to avoid sunburn. Covering will be secured with clips, rocks, or stakes or otherwise protected from the wind.

Transplanting

Shallow swales and holes will be scooped-out and individual cactus placed upright with cactus oriented correctly in the North-facing direction and roots covered by pushing soil around the plant base. Positioning will be checked for stability and adjusted as necessary. Taller cactus may be supported by loosely tying to lathe strips or other upright support.

Many of the cacti to be salvaged prefer rocky habitats. Transplantation beds for these taxa will be filled two-thirds full with sandy well-drained soil from site, and the top layer will be a mix of coarse exposed cobbles collected from the site with silty-sandy fill between.

Depending on rainfall during the season of transplantation, supplemental water will be sparingly applied no more frequently than at two-month intervals. Care should be taken to avoid over-watering, which can cause root rot and encourage pathogenic disease.

All transplantation efforts would be performed in compliance with desert tortoise protection requirements. Existing roads would be used to gain access to areas directly adjacent to the transplant sites. Access from existing roads into undisturbed transplant sites would be by foot. Surface disturbance will be limited to the planting hole, and the topography of the natural landscape will not be altered. Transplanting would be conducted nearby existing access roads to most efficiently plant and water and minimize foot traffic to the greatest extent feasible.

Transplanting will be performed during the cool morning or evening hours. All transplanted succulents would be marked with a tag and/or lath stake and provided a unique identification number. The location of the cactus would be recorded using a Global Positioning System (GPS).

3.4.2.1 Single-Stemmed Cacti

Single-stemmed cacti do not have pads and cannot be salvaged by cutting and would therefore be salvaged by transplanting the entire plant. Species of succulents proposed to be salvaged by transplanting the entire plant include:

- Desert pincushion (*Coryphantha chlorantha*);
- Viviparous foxtail cactus (*Coryphantha vivipara* var. *rosea*);
- Cottontop (*Echinocactus polycephalus*);
- Calico cactus (*Echinocereus engelmanii*);
- Barrel cactus (*Ferocactus cylindraceous*); and
- Fish-hook cactus (*Mammillaria tetrancistra*).

Larger or clumping single-stemmed cacti (cottontop, calico cactus, and barrel cactus) would be extracted by three- to four-person teams and possibly a bobcat or backhoe. They may require guidelines, straps, or slings. Each individual cactus is unique in its shape, size, and terrain where it grows, therefore, creativity and adjustments in materials will be needed to ensure each extraction is safe for workers and the plants. Smaller cacti (desert pincushion, viviparous foxtail cactus, and fish-hook cactus) would be

carefully separated from their rocky substrates by hand. These cacti are small enough to be handled by one or two people and the entire plant will be salvaged. Fish-hook cactus will be individually bagged in paper during transport to avoid velcro-like intertwining of their recurved spines. These smaller cacti species are considered to be desirable horticultural targets (Ingram 2008). Special sequestration (security fencing, locked containers, etc.) will be installed to deter incidental poaching.

3.4.2.2 Jointed (Segmented) Cacti

Jointed (segmented) cacti would be salvaged through propagation of cuttings of pads (*Opuntia* spp.) or joints (*Cylindropuntia* spp). Species of succulents proposed to be salvaged by propagation of cuttings include:

- Buckhorn cholla (*Cylindropuntia acanthocarpa*);
- Silver cholla (*Cylindropuntia echinocarpa*);
- Pencil cholla (*Cylindropuntia ramosissima*);
- Parish's club-cholla (*Grusonia parishii*);
- Beavertail prickly-pear (*Opuntia basilaris*); and
- Mojave prickly-pear (*Opuntia erinacea*).

These cacti represent some of the most abundant and simplest types of plants to salvage. Cholla and prickly-pear cactus have joints or pads that can be easily cut from the plant. Individual cacti too large for transplanting will have three to four pads removed by either cuttings or simply detached at a joint. Size of cuttings will vary.

3.4.2.3 Yucca

Mojave Yucca occurred on the Project Site in significant numbers across the higher elevations of the Project site. Previous attempts at extraction and transplantation of Mojave Yucca have been documented but were only marginally successful, yielding a success rate of less than 50% (Bamberg Ecological, 2006). Due to this uncertainty and the large amount of yucca individuals expected to be salvaged, we are not proposing to mitigate loss of Mojave Yucca through transplantation. Collection of seed is the best and most cost-effective option available at this point. This would require a good rain-year. There is no evidence that these plants can be propagated from cuttings.

<u>Transplant Sites</u>

The majority of succulents identified within the Project site were associated the gravelly, rocky terrain of the stabilized alluvial fan, which occurred in the higher elevations (generally above 2,500 feet) where plant diversity was found to be relatively higher compared to lower elevations of the alluvial fan near the dry lakebed. For these species, a transplant site located northwest of the proposed solar farm would be established for transplantation efforts (Figure 6). The BLM may also use transplanted succulents to rehabilitate previously disturbed areas within their jurisdiction.

4.0 MONITORING AND REPORTING

Monitoring and reporting will begin the quarter after the first target species are salvaged and continue for at least ten years or until success criteria are met, whichever occurs first.

4.1 Monitoring

4.1.1 Pre-Construction to 10-years Post-Construction

The Lead Botanist will monitor all transplanted individuals monthly for a period of two years post-transplantation using a schedule that includes irrigation if necessary and the removal of invasive plant species. After two years, the monitoring schedule will be quarterly until a period of ten years.

4.1.2 Success Criteria

After two years, a success threshold of 50% survivorship of salvaged and transplanted species is targeted.

4.1.3 Adaptive Management

Documentation of techniques used, timing, weather conditions, changes in protocol, and success or failure will be performed by the Lead Botanist at regular intervals. Adaptive management may be employed whenever necessary and will be determined by the Project's Environmental Compliance Monitor, Designated Biologist, and Lead Botanist in coordination with the Bureau of Land Management (BLM).

4.2 Reporting

Monitoring reports are required to evaluate monitoring results to determine if success standards are being met; and if not, to determine what adaptive control measures should be implemented and the rationale for the use of these measures and evaluation of the success of these measures.

4.2.1 Quarterly Reports

Quarterly monitoring results will be presented in a summary report and will include:

- Summaries of any transplanting or seed collection/cuttings conducted in the previous quarter.
- Adaptive management efforts implemented, including date, location, type of treatment, and results.
- Ongoing evaluation of success of transplantation and seedling propagation measures.

Copies of these reports will be kept on file at the site and a copy of each quarterly summary will be sent to the BLM and California Department of Fish and Game (CDFG) for review and comment.

4.2.2 Annual Reports

Annual salvage and transplantation results will be presented in an annual report that will include:

- All salvage and transplantation activities conducted in the previous year.
- Adaptive management efforts implemented, including date, location, type of treatment, and results.
- Ongoing evaluation of success of transplantation and seedling propagation measures.

Copies of these reports will be kept on file at the site and a copy of each annual report will be sent to the BLM and CDFG for review and comment.

4.2.3 Special Reports

Two-Year Post-Construction Monitoring Report

After the initial two-year post-transplanting monitoring is completed, a comprehensive monitoring report will be produced to describe the outcome of vegetation salvage and transplantation on the Project for the initial two-year period. This report will be submitted to the BLM and CDFG for review and comment.

Ten-Year Post-Construction Monitoring Report

After the ten-year post-construction monitoring has been completed, a final and comprehensive monitoring report will be produced to describe the outcome of vegetation salvage and transplantation on the Project. This report will be submitted to the BLM and CDFG for review and comment.

Seed Propagation Report

A special report on the methods used, adaptive management and results will be prepared for the seed collection method since this will be a unique effort in salvage for these species. This report will remain on file with the BLM for use in future efforts to salvage and transplant these species.

5.0 REFERENCES

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